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U.S. Nuclear Regulatory Commission  
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Palisades Nuclear Plant  
Docket 50-255  
License No. DPR-20

Response to Information Notice 2005-26, "Results of Chemical Effects Head Loss Tests in a Simulated PWR Sump Pool Environment," for Palisades Nuclear Plant

On September 16, 2005, the Nuclear Regulatory Commission (NRC) issued Information Notice (IN) 2005-26 to all holders of operating licenses for pressurized water reactors (PWRs). The NRC requested that recipients review the information contained in the notice for applicability to their facilities and consider taking actions, as appropriate, to avoid similar issues.

On September 30, 2005, an NRC public meeting was held on GSI-191 chemical effects head loss information. At the meeting, industry representatives stated that the affected plants, those with tri-sodium phosphate and calcium silicate, would docket responses by November 30, 2005, describing actions that have been taken in regard to the IN. Upon receipt of the IN, NMC performed a review for applicability at Palisades Nuclear Plant (PNP). Enclosure 1 provides the November 30, 2005, docketed response for PNP.

Summary of Commitments

This letter contains no new commitments and no revisions to existing commitments.



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Enclosure (1)

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**ENCLOSURE 1**  
**RESPONSE TO INFORMATION NOTICE 2005-26**  
**PALISADES NUCLEAR PLANT**

Information Notice 2005-26, "Results of Chemical Effects Head Loss Tests in a Simulated PWR Sump Pool Environment," provided the initial results of the Nuclear Regulatory Commission (NRC) sponsored head loss testing being performed at the Argonne National Laboratory (ANL). The information is relevant to plants containing phosphate and calcium sources that may dissolve within the post loss-of-coolant accident (LOCA) containment pool with sufficient concentrations to form calcium phosphate precipitate. The test results indicate that substantial head loss can occur if sufficient calcium phosphate is produced in a sump pool and transported to a preexisting fiber bed on the sump screen. Consequently, the emergency core cooling system (ECCS) flow and containment spray system (CSS) flow could be reduced by the increased head loss across the sump screen. Although significant increases in head loss were observed in the ANL testing, the NRC notes that these head loss results were obtained in a recirculating test loop not intended to be prototypical of PWR plant containments.

Palisades Nuclear Plant (PNP) uses tri-sodium phosphate (TSP) as a buffering agent to increase the pH of the initially acidic post-LOCA containment water to a more neutral pH. PNP calcium sources include the containment concrete and two forms of calcium silicate: 1) pipe insulation and 2) Marinite® fiber board.

As a result of the IN, NMC performed a reassessment of the Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," responses for PNP. The bulletin responses included several commitments to implement compensatory measures at PNP to reduce risk due to post-accident debris blockage. NMC determined that the previous commitments were still appropriate, and identified two additional compensatory measures that could potentially be taken at PNP.

1. Isolating or removing TSP for one cycle
2. Permanently sequestering calcium silicate

NMC has entered the IN into the PNP operating experience (OE) program. The additional compensatory measures identified above will continue to be evaluated under the OE program at PNP.

Isolating or removing TSP from containment would eliminate the TSP chemical effect for one cycle. This potential compensatory measure would remain in place until the 2007 refueling outage, in which the corrective actions to ultimately address GSI-191 would be implemented. However, the isolation or removal of TSP from containment for one cycle is assumed to result in the complete loss of ability to control and neutralize the initially acidic post-accident sump water. In order to accommodate the effect of the loss of sump pH control, deviations from current design basis analysis assumptions are necessary, including exceptions to RG 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," dated July 2000. These deviations and exceptions would require multiple license amendments and 10 CFR exemptions to address both the offsite and control room dose impact without TSP.

There are several concerns associated with the permanent sequestering of calcium silicate from containment at PNP. Replacement of the fiber board blowout panel material may require an Appendix R exemption request, as use of an alternate material would not preserve the existing design basis function of failing under a small differential pressure resulting from water collecting behind the panel. To permit the collecting water to be released for containment sump inventory would require breaches in the Appendix R boundary that could defeat its current fire protective function.

Replacement of calcium silicate pipe insulation with an alternative insulating system which would be immune to chemical effects, such as metallic reflective insulation (MRI), would not address the potential chemical effects involving calcium ion generation from the exposed containment concrete. The concrete contribution could potentially form the chemical substance identified in the IN.

The existing calcium silicate insulation is located on primary coolant system (PCS) components. The replacement activity associated with the insulation would result in a significant amount of radiological dose being received. In addition, localized high temperature areas may be created due to MRI physical installation limitations. Localized high temperature areas could potentially affect equipment environmental qualifications as well as potentially increase the containment average air temperature and, therefore, reduce the design basis accident initial containment temperature margin.

Additional quantities of non-metallic insulation, such as NUKON fibrous insulation, may be required to achieve the design required heat loss coefficients in locations where the full thickness of MRI cannot be achieved. The use of the NUKON fibrous insulation would increase the fibrous debris loading in containment.

Palisades has specific features that are considered to mitigate the consequences of LOCA generated debris and transport that are not currently credited in the design basis analyses. These include conservatism in the debris generation calculation that did not credit the PNP highly compartmentalized containment. The PNP containment design utilizes distinct robust structures and compartments which totally surround the major components of the PCS, including the steam generators and pressurizer. In addition, several areas in the PNP containment would not be initially exposed directly to containment spray, which would further restrict debris generation below the current GSI-191 design basis debris load.

NMC acknowledges the issue identified in IN 2005-26. As a result, NMC continues to investigate the potential additional compensatory measures described above. Further, NMC continues to monitor and support the industry and future testing activities. As previously committed, NMC continues to plan for the implementation of the corrective actions by December 2007, to ultimately address GSI-191 for PNP.